

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* WILLIAM D. SPROUL, MICHAEL E. GRAHAM,  
THOMAS G. PARHAM, ROLF S. BERGMAN,  
and RANDOLPH E. MAXWELL

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Appeal 2007-0075  
Application 10/759,299  
Technology Center 1700

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Decided: February 28, 2007

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Before EDWARD C. KIMLIN, CHUNG K. PAK, and  
CHARLES F. WARREN, *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1 through 15 and 18 through 20, all of the claims pending in the above-identified application. We have jurisdiction pursuant to 35 U.S.C. § 6.

*I. APPEALED SUBJECT MATTER*

The subject matter on appeal is directed to conjugated diene polymers and a method of producing the same (Specification 1). The conjugated diene polymers produced by the method are said to have “excellent wear resistance and mechanical properties and a reduced cold flow...(*id.*)” This appealed subject matter is related to the subject matter considered in Appeal No. 2002-0166 (Application No. 09/033,685) decided on February 4, 2003. Details of the appealed subject matter are recited in representative claims 1 and 20, which are reproduced below:

1. A method of producing a conjugated diene polymer which comprises polymerizing a conjugated diene compound with a catalyst consisting essentially of the following components (a) to (d) in an organic hydrocarbon solvent; and then reacting with at least one compound selected from the group consisting of the following components (i) and (j).

component (a): a compound containing a rare earth element of atomic number 57-71 in the Periodic Table or a compound obtained by reacting the compound with a Lewis base;

component (b): a compound containing at least one halogen atom;

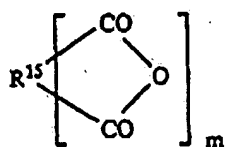
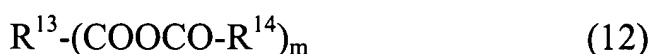
component (c): an aluminxane;

component (d): an organoaluminum compound represented by the following general formula (1):



wherein  $\text{R}^1$  and  $\text{R}^2$  are the same or different and are a hydrocarbon group having a carbon number of 1-10 or a hydrogen atom, and  $\text{R}^3$  is a hydrocarbon group having a carbon number of 1-10 provided that  $\text{R}^3$  is the same as or different from  $\text{R}^1$  or  $\text{R}^2$ ;

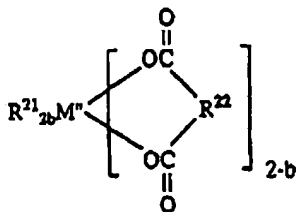
component (i): a carboxylic acid, an acid halide, an ester compound, a carboxylic ester compound or an acid anhydride represented by the following general formula (8), (9), (10), (11) (12) or (13):



(13)

wherein  $R^7$  to  $R^{15}$  are the same or different and are a hydrocarbon group having a carbon number of 1-50, X is a halogen atom and m is an integer of 1-5; and

component (j): a metal salt of a carboxylic acid represented by the following general formula (14), (15) or (16):



(16)

wherein  $R^{16}$  to  $R^{22}$  are the same or different and are a hydrocarbon group having a carbon number of 1-20,  $M''$  is a tin atom, a silicon atom or a germanium atom, and a is an integer of 0-3 and b is an integer of 0-1.

20. A conjugated diene polymer produced by the method of clam 1, wherein said at least one compound selected from the group consisting of the following components (i) and (j) is component (j).

## *II. PRIOR ART*

As evidence of unpatentability of the claimed subject matter, the Examiner has relied upon the following references:

Ikematsu	JP Hei 05-051406 (406)	Mar. 2, 1993
Ikematsu	JP Hei 05-059103 (103)	Mar. 9, 1993
Tsujimoto	JP Hei 08-073515	Mar. 19, 1996

## *III. REJECTIONS*

The Examiner has rejected the claims on appeal as follows:

- 1) Claims 1 through 15 and 18 through 20 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Ikematsu '103 and Tsujimoto; and
- 2) Claims 1 through 15 and 18 through 20 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Ikematsu '406 and Tsujimoto.

## *IV. FACTUAL FINDINGS, ANALYSES, AND CONCLUSIONS OF LAW*

Having carefully evaluated the claims, specification and prior art references, including the arguments advanced by both the Appellants and the Examiner in support of their respective positions, we determine that the Examiner's §§ 102 and 103 rejections are well founded. Accordingly, we will sustain the Examiner's rejections for the factual findings and

conclusions set forth in the Answer. We add following primarily for emphasis and completeness.

Under 35 U.S.C. § 103, a prima facie case of obviousness cannot be established absent some teaching, suggestion, and/or motivation in the applied prior art references and/or knowledge generally available to a person having ordinary skill in the art to arrive at the claimed subject matter. *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1629-30 (Fed. Cir. 1996); *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). The knowledge generally available to a person having ordinary skill in the art includes facts admittedly well known in the art. *See In re Nomiya*, 509 F.2d 566, 570-71, 184 USPQ 607, 611-12 (CCPA 1975)(The admittedly known prior art in the Appellants' Specification may be used in determining the patentability of a claimed invention.); *see also In re Davis*, 305 F.2d 501, 503, 134 USPQ 256, 258 (CCPA 1962).

Here, the Appellants have not disputed the Examiner's finding that Ikematsu '103 and '406 teach the claimed two-step process, except for employing an aluminoxane component as part of their polymerization catalyst systems. (*Compare* Answer 3-6 with Br. 14-19 and Reply Br. 4-5; *see also* Ikematsu '103, page 5, Abstract, pages 5-6, claim 1, and pages 9-11, para. 0006-0009 and Ikematsu '406, page 2, para. 001, pages 3-4, para. 0006, pages 4-6, para. 0010-0014 and 0016). Nor have the Appellants disputed the Examiner's finding that Ikematsu '103 and '406 teach forming conjugated diene polymers having narrow molecular weight distributions and high cis-1, 4-bond contents. (*Compare* Answer 3-6 with Br. 14-19 and

Reply Br. 4-5; see also the examples of Iketmatsu '103 and '406). The Appellants' only argument is that it would not have been obvious to one of ordinary skill in the art to employ an aluminoxane component in the polymerization step taught by Ikematsu '103 or 406. (Br. 15-19). In support of this position, the Appellants also refer to the Rule 132 declaration of record, namely the declaration executed by Takuo Sone, one of the inventors in the present application, on March 30, 2005. (Br. 16-19 and Reply Br. 5).

Therefore, the dispositive question is whether the employment of an aluminoxane component in the polymerization step taught by Ikematus '103 or '406 would have been obvious to one of ordinary skill in the art within the meaning of 35 U.S.C. § 103. On this record, we answer this question in the affirmative.

As indicated *supra*, there is no dispute that Iketmatsu '103 and "406 teach polymerizing conjugated diene with a catalyst system comprising the claimed rare earth metal, halide and organoaluminum compounds in the presence of an inert organic solvent to form conjugated diene polymers having narrow molecular distributions and high cis-1, 4-bond contents. (See also the examples of Iketmatsu '103 and '406). As also indicated *supra*, there is no dispute that Iketmatsu '103 and '406 teach reacting the resulting conjugated diene polymers with the claimed coupling agent to increase the polymer molecular weights or to branch the polymer chains to improve their compatibility with other polymer materials, such as rubbers, fillers and polymer modifiers. (See *also* Iketmatsu '103, paragraphs 0006 and 009 and Iketmatsu '406). The Examiner has acknowledged that Iketmatsu '103 and '406 "do not mention an aluminoxane component, such as methyl

aluminoxane, as part of their catalyst system. (Answer 4 and 6). However, the Examiner has correctly found (Answer 4 and 6) that:

[I]t is well known in the art to add an aluminoxane to a catalyst system for polymerizing conjugated dienes, already comprising a) a lanthanum series rare earth metal compound, b) an organoaluminum and c) a halide compound, for the purpose of obtaining improved activities in the catalyst system, **resulting in narrower molecular weight distribution**, such as taught by Tsujimoto et al. (See ¶ 25 in full translation of Tsujimoto et al.)

We find Tsujimoto teaches that the inclusion of methyl aluminoxane in the catalyst system of the type described in Iketmatsu '103 and '406 improves the catalytic activity in polymerizing conjugated dienes and produces conjugated diene polymers having even narrower molecular weight distribution. (See Tsujimoto, pages 14-16, with focus on the first paragraph of page 16; see also the Appellants' admission at pages 3 and 4 of the Specification).

Given the above teachings, we concur with the Examiner that one of ordinary skill in the art would have been led to employ methyl aluminoxane in the catalyst system of Iketmatsu '103 and '406, motivated by a reasonable expectation of successfully producing conjugated diene polymers having narrower molecular weight distributions (Mw/Mn) than those produced by Iketmatsu '103 or '406 (without methyl aluminoxane as part of the catalyst system). One of ordinary skill in the art would also have been led to further react the resulting conjugated diene polymers with the claimed coupling agent as taught by Iketmatsu '103 and '406, motivated by a reasonable expectation of successfully improving their compatibility with rubbers and fillers as required by both Iketmatus '103 and '406. *See also* the Appellants'

admission at pages 3 and 4 of the Specification directed to conjugated diene polymers produced with a polymerization catalysts containing the claimed components, including an aluminoxane component, having compatibility concerns. Tsujimoto, like Iketmatsu '103 and '406, also teaches blending the resulting conjugated diene polymers with rubbers and/or fillers, thus providing an incentive to further react its conjugated diene polymers like those taught in Iketmatsu '103 and '406. (Tsujimoto, page 13, para. 0032).

The Appellants argue (Br. 16) that:

Appellants have provided a 132 Declaration (herewith in the Evidence Appendix) with experimental data to show that one of ordinary skill in the art would not combine Ikematsu ['103 or] '406 and Tsujimoto '515 and also that the present invention (a combination of the inventions disclosed in Ikematsu '406 [or '103] and Tusjimoto '515) provides a greater than expected result as compared with the expected results from combining Iketmatsu '406 [or '103] with [sic., and] Tusjimoto '515.

Our review of the Rule 132 Declaration indicates that it is not sufficient to rebut the prima facie case of obviousness established by the Examiner.

First, we find that the Appellants have not demonstrated that the showing in the Declaration would have discouraged one of ordinary skill in the art from following the combined teachings of Ikematsu '103 or '406 and Tsujimoto. We find that the showing in the Declaration is consistent with what was reasonably expected by one of ordinary skill in the art from the combined teachings of Kikematsu '103 or '406 and Tsujimoto. (See the Declaration 3-5). Specifically, Table 2 in the Declaration demonstrates that the molecular weight distributions (Mw/Wn) of conjugated diene polymers are further narrowed from, for examples, 4.4 to 3.4 (Runs 5 and 1) by



employing methyl aluminoxane, as taught by Tsujimoto, as part of the polymerization catalyst system of the type described in Iketmatsu '103 or '406. *See, e.g., In re Skoner*, 517 F.2d 947, 950, 186 USPQ 80, 82 (CCPA 1975) ("Expected beneficial results are evidence of obviousness of a claimed invention just as unexpected results are evidence of unobviousness"). Any additional benefits in the improvement of other properties of the Appellants' conjugated diene polymers would have naturally followed from the suggestion of Ikematsu '103 or '406 and Tsujimoto. *Ex parte Obiaya*, 227 USPQ 58, 60 (B. pat. App. & Int. 1985) (the recognition of another advantage flowing naturally from following the suggestion of the prior art cannot be the basis for patentability when the difference would otherwise be obvious); *see also In re Nolan*, 553 F.2d 1261, 1267, 193 USPQ 641, 645 (CCPA 1977) (the Appellants have the burden of showing that any newly discovered advantages outweigh the known advantages expected by one of ordinary skill in the art).

Second, we find that the Appellants have not demonstrated that the showing in the Declaration is reasonably commensurate in scope with the appealed claims. *See In re Clemens*, 622 F.2d 1029, 1035, 206 USPQ 289, 296 (CCPA 1980). While Run 1 representing the claimed invention is limited to polymerizing a specific diene with a specifically prepared and aged polymerization catalyst containing, inter alia, specific rare earth metal, organoaluminum and halogenated silicon compounds under a particular polymerization condition and reacting the resulting polymers with a specific coupling compound, the appealed claims are not so limited. (*See* Specification 37-38 and the Declaration 1-4). The Appellants have not

shown that this limited showing can be extrapolated to, for example, the materially different polymerization catalysts and conditions, and coupling compounds encompassed by the appealed claims. This is especially true in this situation since the examples in Iketmatsu '103 or '406 show that the molecular weight distributions of conjugated diene polymers, for example, can vary depending on the types of catalytic components (e.g., rare earth metal compounds and organoaluminum compounds) employed.

Thus, based on the totality of record, including due consideration of the Appellants' arguments, we determine that the preponderance of evidence weighs most heavily in favor of obviousness within the meaning of 35 U.S.C. § 103. Accordingly, for the factual findings set forth in the Answer and above, we affirm the Examiner's decision rejecting the claims on appeal under 35 U.S.C. § 103(a).

*V. ORDER*

The decision of the Examiner is affirmed.

*VI. TIME PERIOD FOR RESPONSE*

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

**AFFIRMED**

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Application 10/759,299

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